Cracow University of Technology

Course syllabus

binding for the doctoral students of the CUT Doctoral School commencing their studies in the academic year 2022/2023

Information on the course

Name of the course in Polish	Nowoczesne metody spektroskopowe
Name of the course in English	Modern spectroscopic methods
Number of the ECTS points	1
Language of instruction	Polish
Category of the course	Elective
Field of education	Engineering and Technology
Discipline of education	Chemical Engineering
Person responsible for the course Contact	Przemysław Jodłowski, *doctus habilitatus*, DSc, prof. of CUT przemyslaw.jodlowski@pk.edu.pl

Type of course, number of hours in the study programme curriculum

Semester	Credit type (G / NG)*	Lecture	Practical class	Laboratory	Computer laboratory	Project class	Seminar
2	G	15	0	0	0	0	0

*G – graded credit, NG – non-graded credit

Course objectives

Code	Objective description
Objective 1	To acquaint the doctoral student with modern spectroscopic methods.

Learning outcomes

Code	Description of the learning outcome adjusted to the specific characteristics of the discipline	Learning outcome symbol in the CUT SD	Methods of verification
OUTCOMES RELATED TO KNOWLEDGE			
EUW1	The doctoral student knows and understands the selected techniques of molecular spectroscopy.	E_W01, E_W02	A test
EUW2	The doctoral student knows and understands the theoretical basis of the selected spectroscopic techniques.	E_W01, E_W02	A test
OUTCOMES RELATED TO SKILLS			
EU1	The doctoral student is able to select the methods of materials characteristics using the chosen spectroscopic techniques.	E_U01	Giving a paper; a presentation

EUU2	The doctoral student is able to design experiments and select spectroscopic techniques.	E_U02	Giving a paper; a presentation; discussion
OUTCOMES RELATED TO SOCIAL COMPETENCES			
EUK1	The student understands the need to further deepen their knowledge of spectroscopy applicable to their own research work.	E_K01, E_K03	Discussion

Course outline

No.	Contents	Learning outcomes for the course	No. of hours
LECTURE			
W1	Basic information on spectroscopic techniques.	EUW1, EUW2, EUU1, EUU2, EUK1	2
W2	Introduction to materials characteristics and basic quantities.	EUW1, EUW2, EUU1, EUU2, EUK1	2
W3	Introduction to quantum chemistry.	EUW1, EUW2, EUU1, EUU2, EUK1	2
W4	Rotational-vibrational spectroscopy.	EUW1, EUW2, EUU1, EUU2, EUK1	3
W5	Materials characteristics with the use of probe particles.	EUW1, EUW2, EUU1, EUU2, EUK1	2
W6	UV-Vis and UV-Vis DRS spectroscopy.	EUW1, EUW2, EUU1, EUU2, EUK1	2
W7	Synchrotron techniques.	EUW1, EUW2, EUU1, EUU2, EUK1	2

The ECTS points statement

WORKING HOURS SETTLEMENT	
Type of activity	Average number of hours (45 min.) dedicated to the completion of an activity type
SCHEDULED CONTACT HOURS WITH THE ACADEMIC TEACHER	
Hours allotted in the syllabus	15
Consultations	1
Examination / course credit assignment	2
HOURS WITHOUT THE PARTICIPATION OF THE ACADEMIC TEACHER	
Independent study of the course contents	8
Preparation of a paper, report, project, presentation, discussion	4
ECTS POINTS STATEMENT	
Total number of hours	30
The ECTS points number	1

Preliminary requirements

No.	Requirements
1	Knowledge of physical chemistry.

Course credit assignment conditions / method of the final grade calculation

No.	Description
COURSE CREDIT ASSIGNMENT CONDITIONS	
1	80% attendance in class. Giving a paper. Passing the test.
METHOD OF THE FINAL GRADE CALCULATION	
Weighted average of the test and presentation grades.	

Additional information

None

The course reading list

1	Kęcki Z., *Podstawy spektroskopii molekularnej*, Wydawnictwo Naukowe PWN
2	Atkins P. W., *Chemia Fizyczna*, Wydawnictwo Naukowe PWN, Warszawa 2007
3	Piela L., *Idee chemii kwantowej*, Wydawnictwo Naukowe PWN, Warszawa 2006
4	Kołos W., *Elementy chemii kwantowej sposobem niematematycznym wyłożone*, Państwowe Wydawnictwo Naukowe, Warszawa 1979